



Counter UAS Detection and Mitigation

From Portable to Large-Scale System-of-Systems

16 May 2023

We envision a future where our world's airspace is secure, and air mobility is a reality.

Backed by strategic partners like Boeing, Toshiba, Lockheed Martin, and Hanwha, our mission is to digitize, secure, defend, and safeguard the world's airspace. We believe in providing our customers and partners with a scalable, flexible, and fully-integrated ecosystem of airspace awareness and security solutions.

Our advanced distributed radars, fused sensors, and autonomous drone capture capabilities are powered by advanced AI at the Edge. These solutions are being used in public venues, military bases, airports, and other critical infrastructure worldwide, such as:

- U.S. Army
- U.S. Department of Homeland Security
- Qatar Ministry of the Interior 2022 FIFA World Cup
- Ukraine
- UAE (United Arab Emirates) Armed Forces
- Royal Canadian Mounted Police



Airspace Awareness and Security

Redefining C-UAS and Setting the Stage for Advanced Air Mobility (AAM)

Mission-driven, founded in 2016 – Headquartered in Pleasant Grove, UT
121 employees



WHO WE SERVE

Worldwide Defense, Civil Government,
and Commercial Customers



OUR SOLUTIONS

Focus on Airspace
Awareness, Counter-UAS



CERTIFICATIONS

AS 9100D & ISO 9001:2015 Certified, U.S.
Gov't Facility Clearance under NISP

OUR AWARDS

AUVSI Xcellence Award • Enterprise Security - Top 10 Unmanned Security Solution Companies • Innovative Security Product of the Year
Fast Company's - World's Most Innovative Companies • Security Today: Government Security Awards
Security Today: New Product of the Year • Future Security Awards • The Tech Tribune - Best Tech Startups

Fortem Flight Facility in Utah

SkyDome OV-1

1 Detect, Track, Assess, Decide

TrueView® R30 Radar & Camera

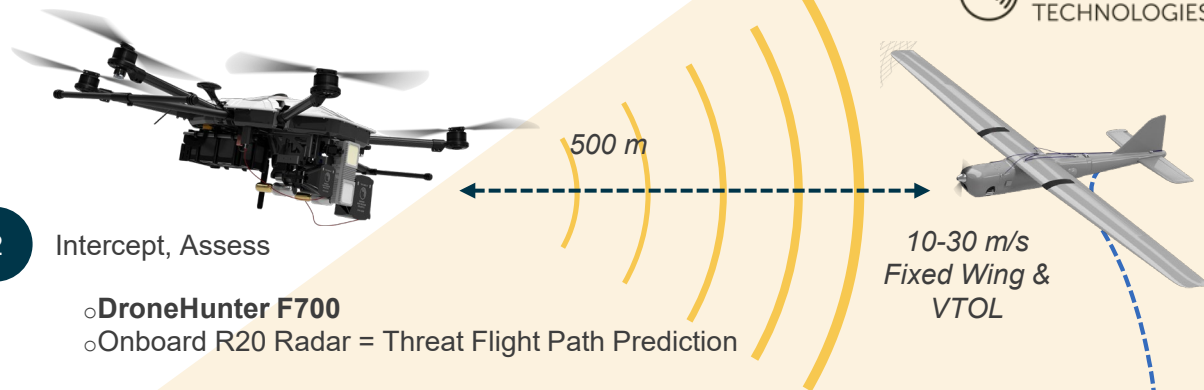


Potential Applications

- Fixed Site
- Portable C-UAS

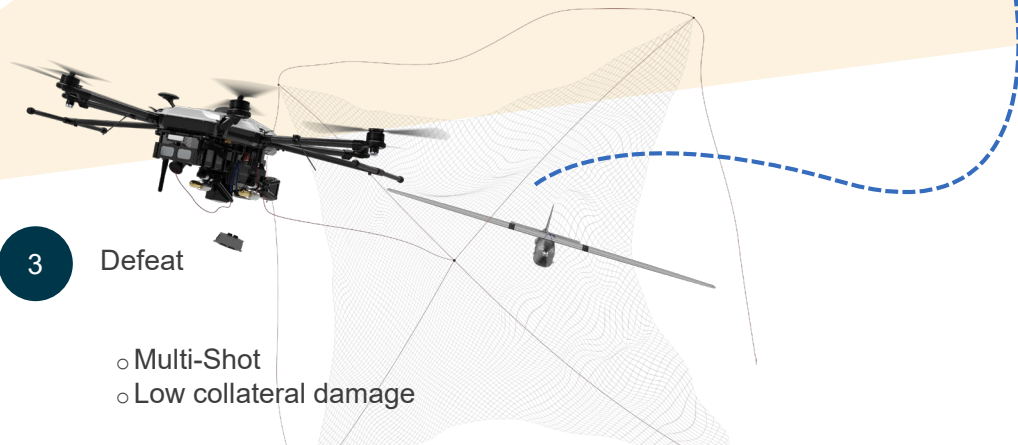
2 Intercept, Assess

- DroneHunter F700
- Onboard R20 Radar = Threat Flight Path Prediction

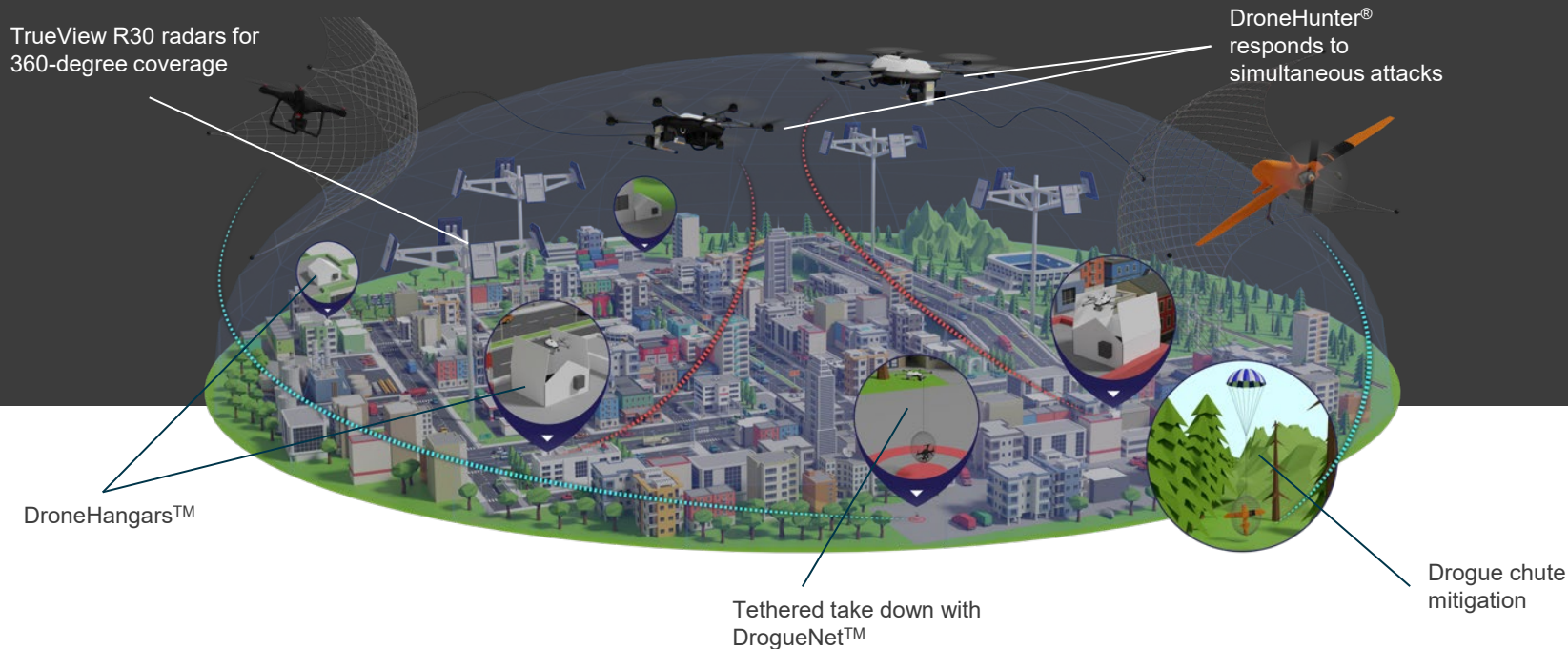


3 Defeat

- Multi-Shot
- Low collateral damage
- Attack Mode Net Capture
- Defense Mode Net capture with Parachute



SkyDome[®] Protection and 360° Awareness





Detect

Layered Detection with the TrueView® Radar and Camera System

- Precise 360° 3D detection of targets using real-time AI at the Edge AI at the Edge
- Radar and EO/IR tracking
- Optical classification, detecting objects in the harshest climates, even in topologically complex or urban environments
- Extended day/night insight

TrueView® R20 Radar ▶



TrueView® R30 Radar and C30 Camera System ▲



Assess

Accurate Assessment with the SkyDome® Manager Software

- Create security zones in 3D
- Real-time operator alerts and notifications
- Custom-generated threat responses
- Integrates with several of today's leading command and control (C2), including FAAD C2, through its rich API



SkyDome® Manager SW ►

Defeat

Unrivaled C-UAS with the DroneHunter® F700 and DroneHangar®

- Long-range mitigation and rapid reuse
- Open API for easy integration
- Advanced AI for autonomous flight
- Onboard optical cameras stream real-time data
- Mitigates Group 1, 2 and Low-end Group 3 Drones; reduces risk of collateral damage

DroneHunter® F700 ▶



DroneHangar® ▲





Use Cases

Threat Set	Location	Size of protected area	Threat Type/ Speed/Size / Weight	Cruise/ Terminal Profile	Threat Guidance	Pre-existing Security Systems	Command and Control	Regulatory	Environment
Casual/ annoyance	Fixed Site	Encampment/ Event	Small Group or Class	Low Altitude Loiter	Active Remote Control	Complex/ Integrated	Integrated with wide array of systems	Laws and regulations	Ability to use GPS / GNSS
ISR	Portable/ relocatable	Venue/FOB/ Site	Large Group or Class	High Altitude Loiter	RF Dark	Simple/ Disparate	Integrated CUAS	Political factors	Power
Deliberate unlawful	Vehicle mounted on the pause	Installation/ Base	Multi-copter/ fixed wing	Orbits/ patterns	GNSS Waypoint	Mismatches	In conjunction with other CUAS	Jurisdiction ambiguity	Network connectivity
Terrorist munitions	Vehicle/ vessel on the move	City	Swarm	Shallow dive	Other (optical, terrain matching, etc.)	None	Independent		Use frequency spectrum
Military munitions	Carriable/ expeditionary	Convoy/ VIP Route				Power/ Network connectivity	Operational Processes/ Human interaction		Urban or rural landscape

C-UAS Products & Solutions Topology



Single Vendor

Standard Products

Integrated Solutions

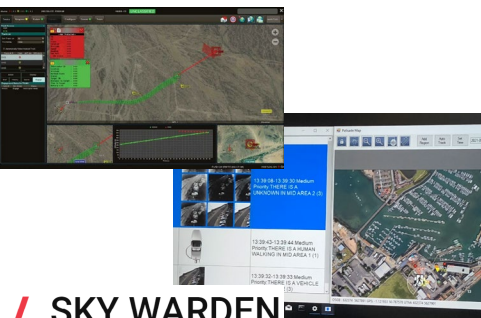
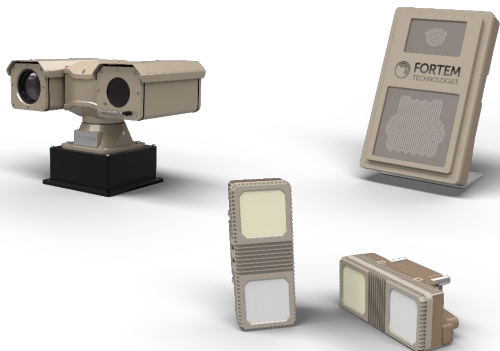
Product

Solution

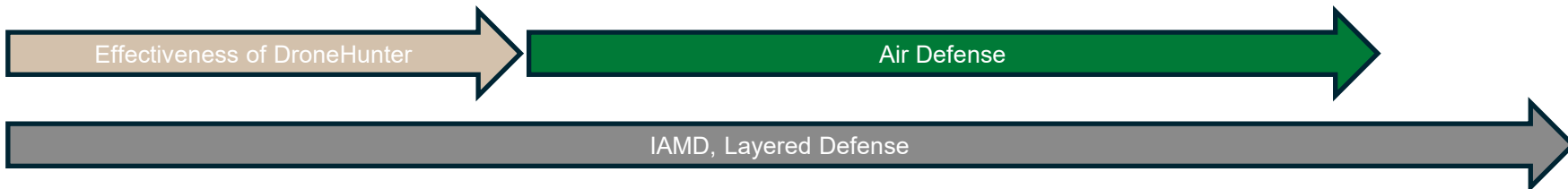
Integrating Existing Systems

Partnered Solutions

Partners



Group 1-3 C-sUAS Gaps and Layered Defense





Group 3 – Drogue Net

Device attaches to the DroneHunter

- Carries a drogue parachute
- Parachute attaches to the net in the NetGun

Once the net is fired and attaches to the target, the drogue parachute is pulled from its tube by the force of the target

The drogue parachute stalls out the target drone causing it to crash

Permits defeat of Group 2/3 drones that cannot be towed by DroneHunter.



The Drogue Net attaches to the tether release and is connected to the defense net tether







Ukraine Portable Counter UAS System

1. **Detect and Mitigate Group 1 & 2 Multi-copter & Fixed Wing Threats**
2. **Two Person Carry Operational System (2 Backpacks and 1 DroneHunter + Case)**
 - Radar Monitoring System (including 4-hour battery)
 - DroneHunter in Hard Case
 - Counter UAS Command & Control Software & Hardened Laptop
 - DroneHunter Operational Equipment (Net system, battery, etc.)
3. **Counter UAS Operational Support Kit**
 - Includes equipment for additional operational missions and maintenance.
4. **Training Included**

Features:

- **Waterproof and dust tight backpackable hard cases**
- **Rapid setup (<15 min)**

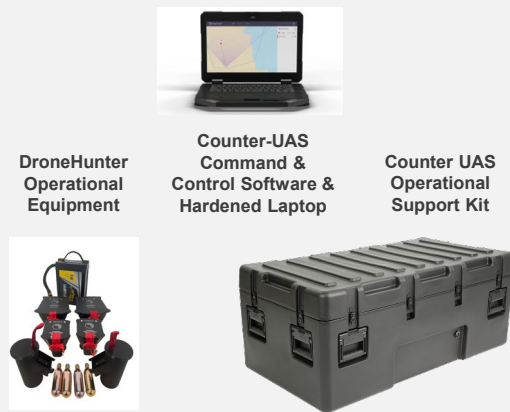
2-Person Operational System



Radar, DroneHunter & Radio



Operational and Support Equipment





Keys to Ukraine Success

Rapid Solution

Rapid Manufacturing

Rapid Fielding

Rapid Training

Rapid Iteration

Rapid Procurement

Autonomy, Autonomy, Autonomy

Cost Effective





Ukraine C-sUAS Threat matrix

Threat	ORLAN-10	GRANAT-1/2/3/4	ELERON-3SV	TAKHION	Shahed-136	QODS Mohajer 6	FORPOST
GTOW	18 Kg	30 Kg	5.5 Kg	25 Kg	200 Kg	670 Kg	450 Kg
Cruise Speed	25 m/s	16-33 m/s	16-36 m/s	18 m/s	33 m/s	36 m/s	30-42 m/s
Typical Altitude	700-1500 m	120 m	120 m	1-2 km	120 m	5km loiter	5km loiter
Terminal Employment	ISR Loiter Targeting	ISR Loiter Targeting	ISR Loiter Targeting	ISR Loiter Targeting	45 deg dive with bomb	High Altitude ISR	High Altitude ISR
DroneHunter Match?	Must detect early	Yes	Yes	Yes	Must detect early	No	No

DroneHunter Effectiveness

Traditional Air Defense



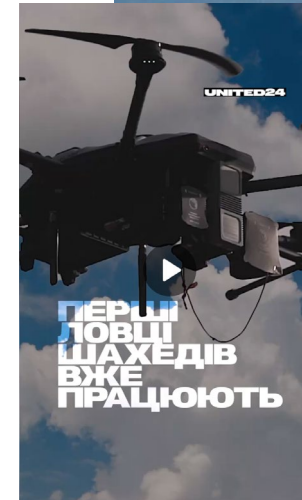
North Korea C-sUAS Threat Matrix

Threat	Sky-09P based	UV-10CAM based	Turumi	Panghyon-1,2	Tu-143 based	Shmel-1 based	MQM-107D based
	 South Korea Defense Ministry	 South Korea Defense Ministry	 YouTube/MBCNEWS	 China Defense Ministry/Wikimedia Commons	 Wikimedia Commons	 Wikimedia Commons	 Wikimedia Commons
GTOW	15 Kg	12.7 Kg	35 Kg	140 Kg	1230 Kg	130 Kg	662 Kg
Cruise Speed (est)	90 km/h	88 km/h	90 km/h	130 km/h	760 km/h	144 km/h	320 km/h
Altitude (typical est)	0.5-1.5 km	0.5-1.5 km	0.5-1.5 km	1.5-3 km	3-5 km	2-3 km	2-3 km
Radar Cross Section (est)	0.1 m ²	0.1 m ²	0.1 m ²	0.1-0.3 m ²	1-3 m ²	0.1-0.3 m ²	0.3-1 m ²
Terminal Employment	Low Altitude ISR Loiter	Low Altitude ISR Loiter	Low Altitude ISR Loiter	ISR Loiter Targeting	Dive bomb	High Altitude ISR Loiter	Dive bomb
Layered Defense Solution	DroneHunter Effectiveness			Integrated Air Missile Defense			



Summary

- Solutions require knowledge of the purpose and intent
 - More complex than who/what/when/where/why
- There can be simple solutions if the problem is simple
 - ...be ready to make it more complex next year...
- There is no silver bullet / CUAS does not have a one-size-fits-all solution
- Flexibility to be **integrated** or to **integrate** is paramount
- Autonomy increases flexibility
- Ability to rapidly adjust to threats is needed now and will be in the future





End



FORTEM[®]
TECHNOLOGIES

